MASONRY II

COURSE DESCRIPTION

***Masonry II* is a course in which students will learn and practice intermediate skills related to masonry construction in residential and commercial structures. Topics covered include safe practices, advanced construction drawing interpretation, design of panel and curtain walls, construction planning and scheduling. This course gives students a substantial skill and knowledge foundation typically required for apprentice electricians.**

Prerequisite(s):	Masonry I, Algebra I or Math for Technology II Geometry, Principles of Technology I or Physical Science (may be concurrent)
Recommended Credits:	2
Recommended Grade Level(s):	12^{th}

MASONRY II STANDARDS

1.0 Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

2.0 Students will take personal responsibility for the safety of themselves, their coworkers, and bystanders.

3.0 Students will interpret, lay out, and fabricate in conformance to construction drawings and written specifications.

4.0 Students will analyze masonry designs for non-load-bearing walls in commercial structures.

5.0 Students will develop construction plans and schedules.

6.0 Students will construct masonry arches.

MASONRY II

STANDARD 1.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

1.1 Demonstrate leadership skills.
1.2 Use problem-solving techniques to address and propose solutions to school, community, and workplace problems.
1.3 Demonstrate the ability to work professionally with others.
1.4 Participate in SkillsUSA-VICA as an integral part of instruction.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

1.1.A Exhibits integrity and pride in workmanship.
1.1.B Keeps group work focused on task.
1.2.A Determines the root causes of observed conflicts or problems.
1.2.B Mediates disputes between parties.
1.3.A Participates in a job shadowing experience.
1.3.B Assembles a student team to solve an assigned problem.
1.4.A Attends and participates in periodic meetings of SkillsUSA-VICA or similar organization.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Prepare a resume.
- Participate in various SkillsUSA-VICA or similar programs and/or competitive events.
- Attend a professional organization meeting such as, local Chamber of Commerce meeting.
- Participate in the American Spirit Award competition with SkillsUSA-VICA.
- Participate in job shadowing or internship program with local business or industry.
- Take an active role in a group project assigned by the instructor.
- Identify and detail a problem area in the school, community, or workplace and propose solutions. If possible, and with appropriate approvals, implement or facilitate the solution.

INTEGRATION LINKAGES

SkillsUSA-VICA, *Professional Development Program,* SkillsUSA-VICA, Communication and Writing Skills, Teambuilding Skills, Research, Language Arts, Sociology, Psychology, Algebra, Geometry, Applied Communication, Social Studies, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, SCANS (Secretary's Commission on Achieving Necessary Skills), Chamber of Commerce, Colleges, Universities, Technology Centers, and Employment Agencies

MASONRY II

STANDARD 2.0

Students will assume responsibility for the safety of themselves, their coworkers, and bystanders.

LEARNING EXPECTATIONS

The student will:

2.1 Exhibit and encourage in others a positive attitude regarding safety practices and issues.
2.2 Habitually inspect and use appropriate personal protective equipment for assigned tasks.
2.3 Inspect, maintain, and employ safe operating procedures with tools and equipment, such as electrical test equipment, lifting equipment, powder actuated drivers, and high pressure gas containers.
2.4 Exhibit a well-developed awareness of potential hazards to themselves and others.
2.5 Carry out responsibilities under HazCom (Hazard Communication) regulations.
2.6 Take action to protect coworkers and bystanders from hazards as required by regulations, and company policies.
2.7 Report accidents and observed hazards and execute emergency response procedures as required by regulations and company policies.
2.8 Demonstrate appropriate related safety procedures.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

2.1.A Includes safety procedures in activity plans.
2.1.B Exhibits an awareness of proper safety procedures by coworkers.
2.1.C Responds positively to instruction, advice, and correction regarding safety issues.
2.1.D Reports to school or work physically ready to perform to professional standards, such as rested, or not impaired by medications, drugs, alcohol, etc.
2.2.A Selects, inspects, and uses the correct personal protective equipment for the assigned task.
2.3.A Uses disconnect switches and lockout/tagout proceedures.
2.3.B Inspects extension cords for the presence of a functional ground connection, prior to use.
2.4.A Is observant of personnel and activities in the vicinity of their work area.
2.4.B Warns nearby personnel, prior to starting potentially hazardous actions.
2.5.A Applies information from material safety data sheets (MSDSs) to protect self and others from the health hazards associated with assigned tasks.
2.5.B Reports hazards found on the job site to the supervisor and remedies the hazard as instructed.
2.6.A Anticipates and warns by standers when using air and powder actuated drivers.
2.6.B Provides and activates adequate ventilation equipment as required by the task.
2.7.A Reports all injuries and observed unguarded hazards to the immediate supervisor.
2.7.B Executes assigned tasks as described in emergency response procedures.
2.8.A Passes with 100 % accuracy a written examination relating to safety issues.
2.8.B Passes with 100% accuracy a performance examination relating to safety.
2.8.C Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Prior to assigning a task using power tools, the instructor removes some required safety items and instructs students to perform an inspection of tools.
- Instruct a visitor to obviously approach the vicinity of a student conducting a hazardous activity, and note the level of awareness demonstrated by the student.
- In a project requiring solvents or adhesives, introduce a new brand or type, and require students to retrieve the MSDS and identify possible health hazards.

INTEGRATION/LINKAGES

Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, Applied Communication, Secretary's Commission on Achieving Necessary Skills (SCANS), Skills USA-VICA, Associated Builders and Contractors (ABC), Associated General Contractors (AGC), National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, United States Department of Labor, Tennessee Department of Labor

MASONRY II

STANDARD 3.0

Students will interpret, lay out, and fabricate in conformance to construction drawings and written specifications.

LEARNING EXPECTATIONS

The student will:

3.1 Scale dimensions that are not explicitly included in construction drawings.
3.2 Interpret plan and elevation views shown in construction drawings.
3.3 Recognize and interpret lines and symbols commonly used in construction drawings.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

3.1.A Uses the scale of a drawing to determine locations not explicitly dimensioned.
3.1.B Uses the scale of a drawing to determine dimensions not explicitly shown on drawing.
3.2.A Interprets three-dimensional features found in construction drawings.
3.3.A Readily relates structural masonry components and joints with symbols and masonry details in construction drawings.
3.3.B Interprets object lines, dimension and extension lines, center lines, section lines, and other lines commonly found in construction drawings.
3.3.C Readily relates symbols and details of framing, electrical, and plumbing elements that effect or could be affected by masonry decisions.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Given a set of plans and specifications for a residential or commercial structure, make a complete material take-off for the masonry components.
- Given a set of plans and specifications for a residential or commercial structure, determine the location of masonry elements not explicitly dimensioned.
- Determine the detail of specified routing and structural supports for conduit or piping runs through masonry structures shown in construction drawings.

INTEGRATION/LINKAGES

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MASONRY II

STANDARD 4.0

Students will analyze masonry designs for non-load-bearing walls in commercial structures.

LEARNING EXPECTATIONS

The student will:

4.1 Analyze lateral loads on high-rise building walls.
4.2 Compare and contrast panel and curtain masonry walls.
4.3 Determine the reinforcement and connection methods required to resist and transfer lateral loads from panel and curtain loads to the building frame.
4.4 Comprehend the function, use, and construction of control and expansion joints in masonry walls.
4.5 Comprehend moisture control methods used with panel and curtain walls.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

4.1.A Determines design wind pressures for walls based on location and height of buildings, building codes, and weather history.
4.1.B Determines total design lateral loads on given panel or curtain walls.
4.2.A. Compares and contrasts how panel and curtain walls are supported.
4.2.B Compares and contrasts how panel and curtain walls transfer lateral loads.
4.3.A Designs reinforcement for given panel or curtain walls with specified lateral load.
4.3.B Determines possible attachment methods to transfer loads from given panel or curtain walls to a building frame.
4.4.A Determines the local industry practice and building code requirements for control and expansion joints in masonry walls.
4.4.B Writes a detailed procedure for installing expansion joints as detailed in construction drawings and specifications.
4.5.A Proposes and defends techniques for controlling moisture for given panel and curtain walls.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Propose alternate designs (i.e. material, reinforcement, attachment, flashing, and so forth) to those detailed in construction drawings.
- Compare and contrast expansion joint designs in light of material and labor cost.

INTEGRATION/LINKAGES

Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, Applied Communication, Secretary's Commission on Achieving Necessary Skills (SCANS), Skills USA-VICA, Associated Builders and Contractors (ABC), Associated General Contractors (AGC), National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, United States Department of Labor, Tennessee Department of Labor

MASONRY II

STANDARD 5.0

Students will develop construction plans and schedules.

LEARNING EXPECTATIONS

The student will:

5.1 Analyze tasks required to execute construction projects.
5.2 Create and document plans and schedules for construction projects.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

5.1.A Lists tasks required for a project.
5.1.B Determines interactions between and sequencing for tasks required for a project.
5.1.C Determines logistical requirements for each task.
5.1.D Determines responsibilities for management and quality control for each task.
5.2.A Determines time required for each task.
5.2.B Creates a workflow over-time plan to execute the project.
5.2.C Documents the workflow plan, such as flow chart, Critical Path Management (CPM) document and horizontal bar chart.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Create a plan for a project that requires only masonry work.
- Create and document a plan for a complex project involving several construction trades.

INTEGRATION/LINKAGES

Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, Applied Communication, Secretary's Commission on Achieving Necessary Skills (SCANS), Skills USA-VICA, Associated Builders and Contractors (ABC), Associated General Contractors (AGC), National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, United States Department of Labor, Tennessee Department of Labor

MASONRY II

STANDARD 6.0

Students will construct masonry arches.

LEARNING EXPECTATIONS

The student will:

6.1 Compare and contrast common forms of arches.
6.2 Comprehend the theory and terminology of arch design.
6.3 Demonstrate arch form construction and masonry layup.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

6.1.A Classifies arches in terms of span and load as major or minor arches.
6.1.B Defines the characteristics of the basic masonry arch forms, such as a Tudor arch, parabolic arch, or a segmental arch.
6.2.A Uses vectors to analyze the force transfer between the components of an arch.
6.2.B Defines the major parts of an arch.
6.2.C Calculates the rise-to-span ratio of an arch.
6.3.A Lays out arches having a circular or parabolic intrados using geometric construction techniques.
6.3.B Constructs an arch form.
6.3.C Constructs a masonry arch.

SAMPLE PERFORMANCE TASKS

- Construct a minor masonry arch using brick, stone, or tile.
- Find, measure, and classify examples of arches existing in the community.
- Conduct Internet research and write a report that compares and contrasts types of arches used in different cultures and locations.

INTEGRATION/LINKAGES

Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, Applied Communication, Secretary's Commission on Achieving Necessary Skills (SCANS), Skills USA-VICA, Associated Builders and Contractors (ABC), Associated General Contractors (AGC), National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, United States Department of Labor, Tennessee Department of Labor

SAMPLING OF AVAILABLE RESOURCES

- National Center for Construction Education and Research (NCCER), *Core Curriculum*. Prentice Hall, Upper Saddle River, NJ; ©2000. Also known as the "Wheels of Learning" materials.
- National Center for Construction Education and Research (NCCER), *Masonry Level One*. Prentice Hall, Upper Saddle River, NJ; ©1996. Also known as the "Wheels of Learning" materials.
- National Center for Construction Education and Research (NCCER), *Masonry Level Two*. Prentice Hall, Upper Saddle River, NJ; ©1999. Also known as the "Wheels of Learning" materials.
- National Center for Construction Education and Research (NCCER), *Masonry Level Three*. Prentice Hall, Upper Saddle River, NJ; ©1999. Also known as the "Wheels of Learning" materials.
- James E. Amrhein, *Reinforced Masonry Engineering Handbook*. Masonry Institute of America, Second Edition; ©1972, 1973.
- Jack D. Bakos, Jr., *Structural Analysis for Engineering Technology*. Charles E, Merrill Publishing Company, Columbus, OH; ©1973.
- Paul F. Rice, et. al., *Structural Design Guide to the ACI Building Code*. Van Nostrand Reinhold Company, New York, NY; ©1985.